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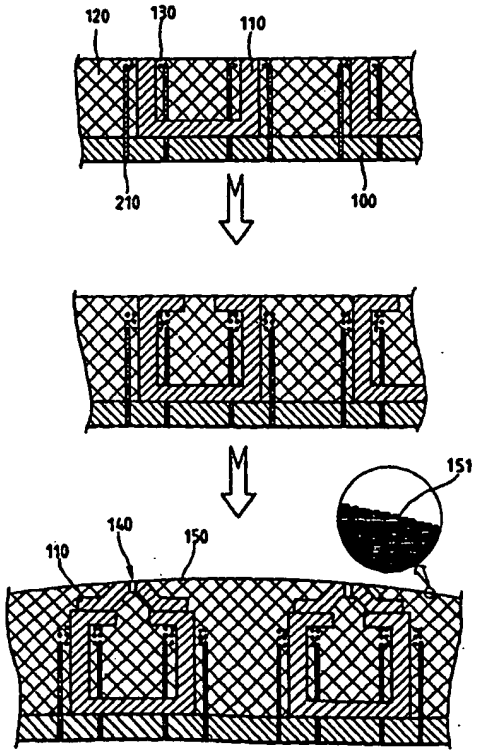
(54) Title: THIN FILM MAGNETIC HEAD TIP AND MANUFACTURING METHOD THEREFOR

(57) Abstract

A thin film magnetic head tip, and a method for manufacturing the thin film magnetic head tip by a wafer process, are provided. A base (120) material is stacked on a wafer (100) and a core (110) is stacked partially within the base material to form an azimuth groove (140). Conductive points (210) are within a plurality of holes passed through the wafer (100). A coil (130) is stacked being connected to the conductive points (210), and the surface of the core (110) with the azimuth angle and the base (120) are rounded.



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THIN FILM MAGNETIC HEAD TIP AND MANUFACTURING METHOD THEREFOR

Technical Field

The present invention relates to a thin film magnetic head tip of a videocassette recorder (VCR), used for recording/reproducing information onto/from a tape and a manufacturing method therefor.

Background Art

Generally, a VCR includes a head drum 2 as shown in FIG. 1 for diagonally scanning a magnetic tape 1 with respect to the traveling direction thereof in order to read information recorded on the traveling magnetic tape 1 or record new information onto the magnetic tape 1.

The head drum 2 includes a fixed drum 3 for guiding the magnetic tape 1, a rotary drum 4 rotatably installed on a shaft of the fixed drum 3 and a magnetic head 5 installed in the rotary drum 4. Also, as shown in FIG. 1, the magnetic head 5 includes a head base 6 and a magnetic head tip 7.

Referring to FIG. 2, the magnetic head tip 7 is manufactured by various processes. That is, cores 9 and 9′ are manufactured separately and the spacing between the cores 9 and 9′ is determined after lapping, bonding and assembly processes.

However, the above magnetic head tip 7 and the manufacturing method therefor are not desirable due to various errors and deviations caused during the various processes. Also, since the cores 9 and 9′ should be formed of ferrite, it is difficult to minimize the size of the core 9 and 9′.

To solve this problem, in Korean Patent Application No. 95-2081, filed Feb. 6, 1995, entitled "magnetic head and manufacturing method therefor", there is described a magnetic layer which is selectively formed, so that a magnetic path is shortened, reducing inductance. Also, a separate manufacturing process for two cores is not required, improving yield.

However, the method for manufacturing the magnetic head includes various

processing steps as before: the step of attaching a substrate member processed to have a predetermined azimuth angle to the uppermost layer of a stacked structure, the step of forming a window for winding, the step of machining one side of the magnetic head in a predetermined curvature in order to improve the contact to a tape, and the step of performing the winding.

Disclosure of the Invention

It is an object of the present invention to provide a thin film magnetic head tip and a manufacturing method therefor, which reduces the manufacturing steps of a magnetic head and makes possible the mass production of the magnetic head.

According to an aspect of the present invention, there is provided a thin film magnetic head tip comprising: a wafer being a non-magnetic insulator; a conductive contact point within a plurality of holes formed through the wafer; a base being a non-magnetic insulator, stacked on the wafer; a magnetic core being partially within the base, having an azimuth groove; and a coil within the base wound around the core, having two ends each connected to the conductive contact points.

According to another aspect of the present invention, there is provided a method for manufacturing a thin film magnetic head tip comprising the steps of: (a) forming a plurality of holes passing through a wafer; (b) filling the holes with a conductive material; (c) stacking a base being a non-magnetic insulator, a magnetic core having an azimuth groove, and a coil within the base around the magnetic core on the wafer in a predetermined shape by a wafer process; and (d) cutting the stacked wafer into thin film magnetic head tips.

In the thin film magnetic head tip and the manufacturing method therefor according to the present invention, the manual manufacturing steps for the magnetic head are reduced and the mass production of the magnetic head is achieved effectively.

Brief Description of the Drawings

FIG. 1 is a perspective view of a head drum for a videocassette recorder (VCR);

FIG. 2 is a perspective view of the magnetic head tip of FIG. 1;

FIG. 3 is a partially cutaway perspective view of a wafer used for a thin film magnetic head tip according to the present invention;

FIG. 4 is a sectional view illustrating the step of stacking to form a thin film magnetic head tip of the present invention by a wafer process;

FIG. 5 is a perspective view of a wafer plate in which the thin film magnetic head tip of the present invention is formed by stacking;

FIG. 6 is a perspective view of the thin film magnetic head tip obtained by cutting the wafer plate of FIG. 5; and

FIG. 7 is a perspective view showing a step in which the thin film magnetic head tip of the present invention is attached to a head base.

Best mode for carrying out the Invention

A thin film magnetic head tip according to the present invention is manufactured by a well-known wafer process. As shown in FIG. 4, the wafer process is for sequentially stacking predetermined material onto a wafer 100 of FIG. 3 using sputtering, deposition and photolithography processes.

As shown in FIGS. 3 and 7, holes formed through the wafer 100 used for the wafer process are filled with metal such as copper (Cu). One side of the metal is used as a contact point 210 when connecting a thin film magnetic head tip 200 to a head base 300. The other side of the metal is connected to a conductive coil 130 (see FIG. 4) which will be described later.

Referring to FIG. 4, a magnetic core 110, a base 120 being a non-magnetic insulator and a conductive coil 130 are stacked on the wafer 100 in a predetermined shape by deposition and photolithography methods.

The conductive coil 130 is formed within the base 120 around the magnetic core 110, and two ends of the conductive coil 130 are connected to two of the contact points 210 formed on the wafer 100, respectively. That is, the conductive coil 130 is stacked together with the base 120 and the magnetic core 110 while winding the magnetic core 110.

The magnetic core 110 is formed of iron (Fe) compounds or amorphous alloy containing cobalt (Co) having high magnetic permeability, high saturation magnetic flux density and less coercive force, and the base 120 being the non-

magnetic insulator is a material having a thermal expansion coefficient which is similar to that of the material used for the magnetic core 110, and a strong antiabrasion property. Also, the conductive coil 130 is formed of metal such as Cu having high conductivity.

Referring to FIG. 4, in the final step, an azimuth groove 140 and a curved surface 150 are formed atop the magnetic core 110. The azimuth groove 140 and the curved surface 150 are intentionally formed by deposition and photolithography processes. The magnetic cores 110 are separated from each other by the azimuth groove 140, and the curved surface 150 contacts the magnetic tape 1 of FIG. 1.

When the curved surface 150 is formed by the deposition and photolithography methods, a staircase texture 151 is formed on the curved surface 150 as shown in the enlarged view of FIG. 4. However, since the height of a staircase texture 151 is below several micrometers, the curved surface 150 is capable of smoothly contacting the magnetic tape 1 of FIG. 1.

As described above, a wafer plate 400 of FIG. 5, manufactured by the wafer process, is cut into a plurality of thin film magnetic head tips 200 of FIG. 6 of a proper size by a cutter (not shown). The azimuth groove 140 is formed in the curved surface 150 formed on the thin film magnetic head tip 200. Even though the number of thin film magnetic head tips obtained from one wafer plate is dependent on the size of the wafer plate, several hundreds of thin film magnetic head tips 200 are obtained from one wafer plate in general.

As described above, the thin film magnetic head tip 200 obtained by cutting the wafer plate manufactured by the wafer process is attached to the head base 300 as shown in FIG. 7.

Industrial Applicability

According to the thin film magnetic head tip and the manufacturing method therefor, the number of manual processes for manufacturing the magnetic head is reduced and the magnetic head can be effectively produced by mass production. In particular, the manufacturing process is simplified since additional processes for forming the curved surface contacting the magnetic tape are not required.

CLAIMS:

1. A thin film magnetic head tip comprising:

a wafer (100) being a non-magnetic insulator;

a conductive contact point (210) within a plurality of holes formed through the wafer (100);

a base (120) being a non-magnetic insulator, stacked on the wafer;

a magnetic core (110) being partially within the base (120), having an azimuth groove (140); and

a coil (130) within the base (120) wound around the core, having two ends each connected to the conductive contact points (210).

2. A thin film magnetic head tip as claimed in claim 1, comprising a curved surface (150) formed being curved together with the surface of the magnetic core (110) with the azimuth groove (140) and the base (120).

3. A thin film magnetic head tip as claimed in claim 1 or 2, wherein the conductive contact point (120) is formed of metal.

4. A method for manufacturing a thin film magnetic head tip comprising the steps of:

(a) forming a plurality of holes passing through a wafer (100);

(b) filling the holes with a conductive material;

(c) stacking a base (120) being a non-magnetic insulator, a magnetic core (110) having an azimuth groove (140), and a coil (130) within the base (120) around the magnetic core (110) on the wafer (100) in a predetermined shape by a wafer process; and

(d) cutting the stacked wafer into thin film magnetic head tips.

5. A method for manufacturing a thin film magnetic head tip as claimed in claim 4, wherein the magnetic core (110) and the base (120) are stacked in a staircase shape to form a curved surface (150) curved together with the surface of the magnetic core (110) with the azimuth groove (140) and the base (120) during the step (c).

6. A method for manufacturing a thin film magnetic head tip as claimed in claim 4 or 5, wherein in the step (c), a predetermined material is sequentially deposited on the wafer (100) in a predetermined shape by deposition and

photolithography methods.

FIG. 1

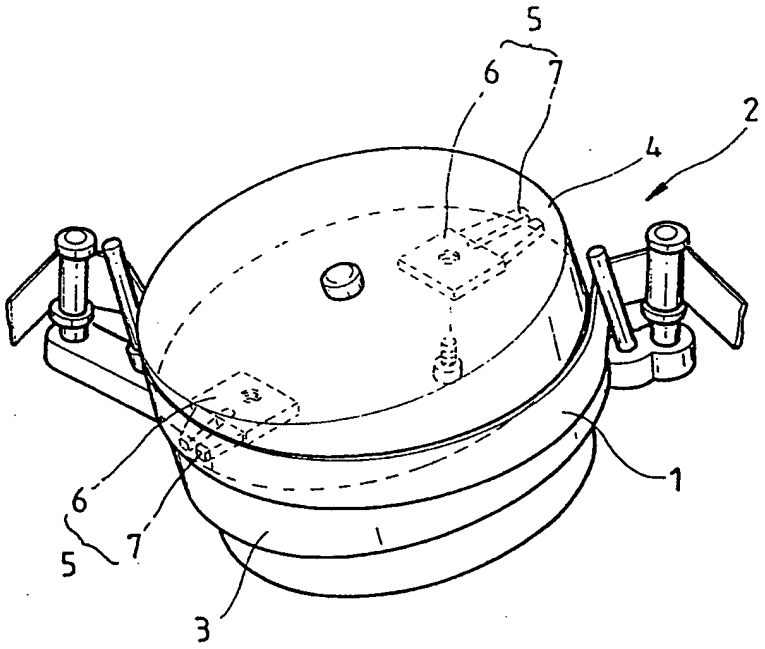


FIG. 2

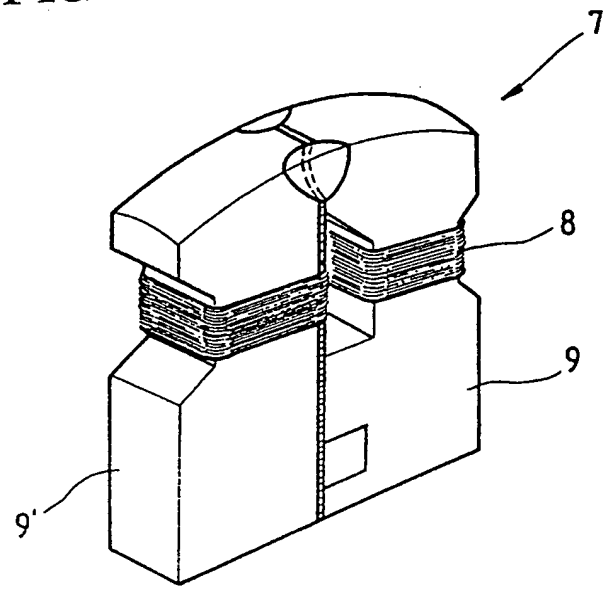


FIG. 3

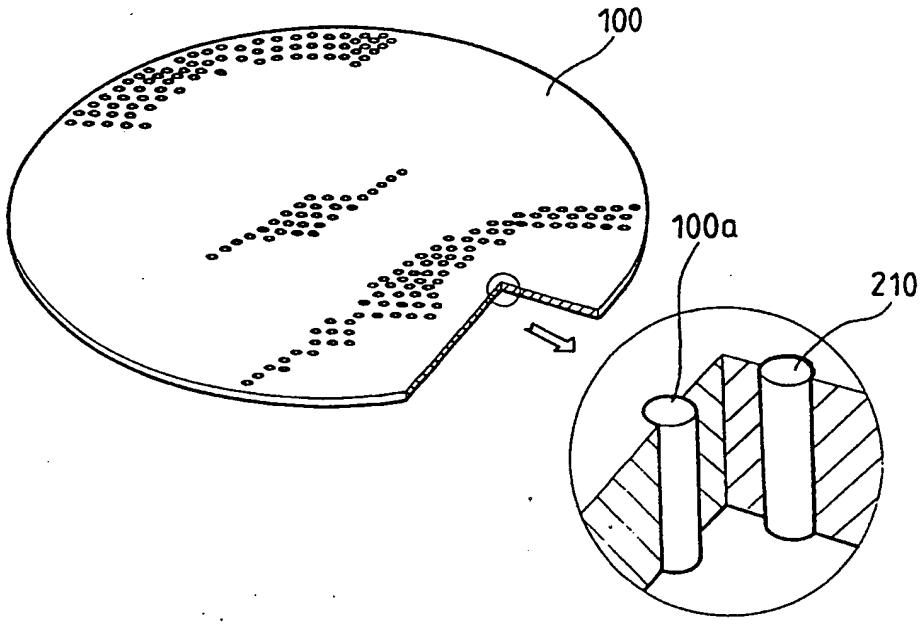


FIG. 4

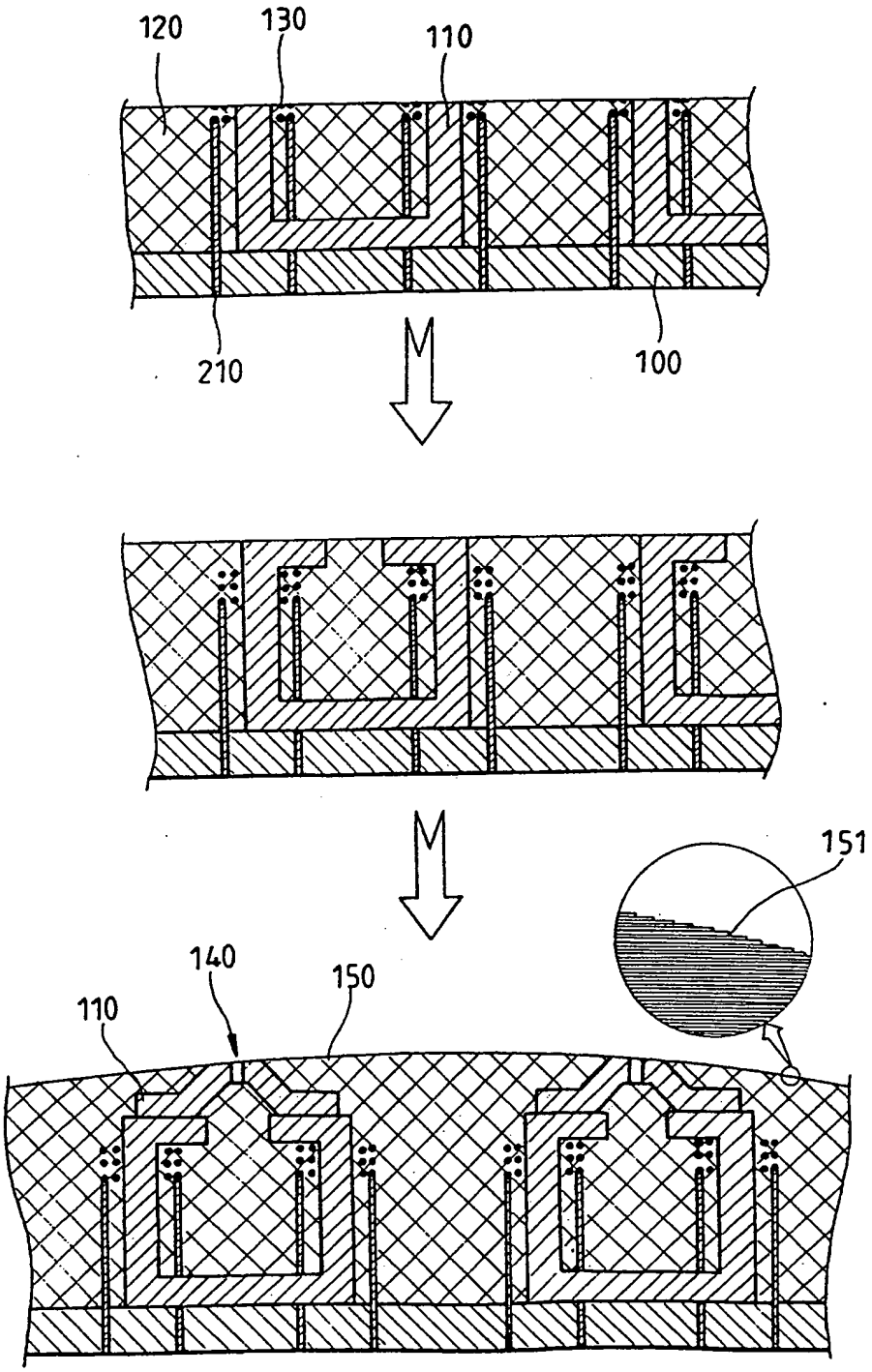


FIG. 5

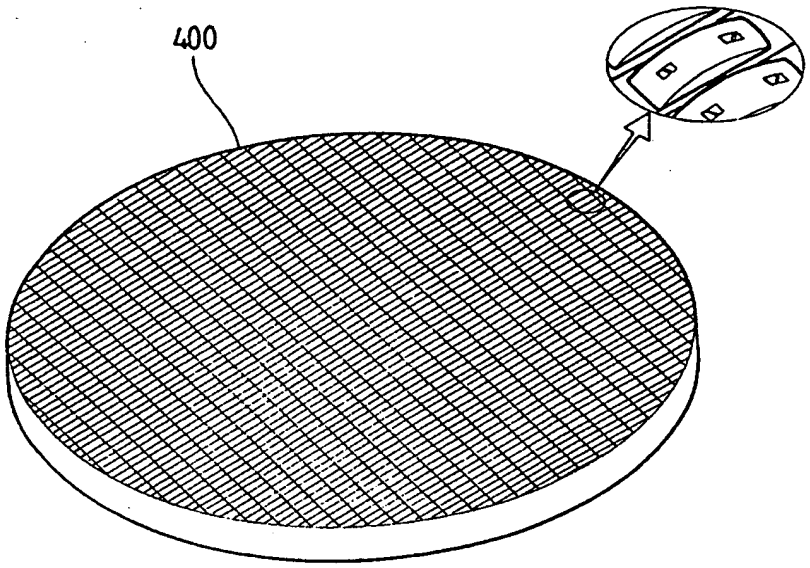


FIG. 6

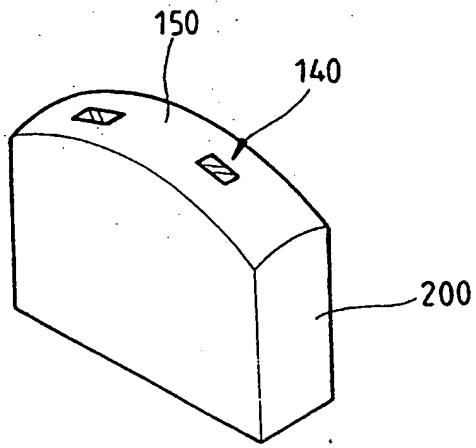
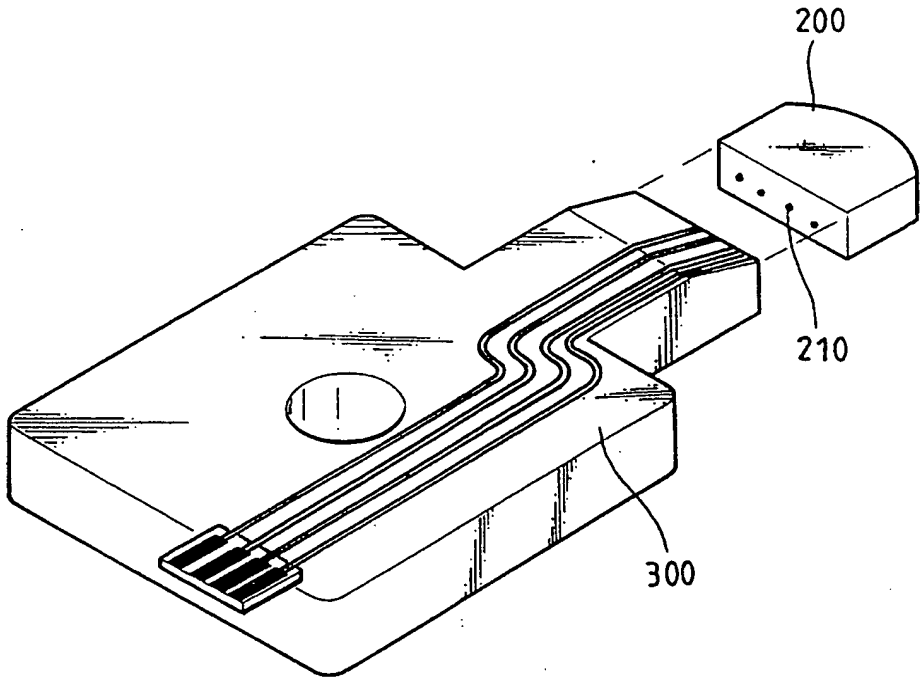


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 97/00113

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: G 11 B 5/31, 5/187, 5/255

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

IPC[6]: G 11 B 5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 583 921 A1 (IBM) 23 February 1994 (23.02.94), abstract; fig.3-5; column 8, line 1 - column 11, line 3.	1-6
A	EP 0 515 786 A1 (READ-RITE CORP.) 02 December 1992 (02.12.92), abstract; fig.1-5; column 3, line 18 - column 4, line 13.	1-6
A	EP 0 407 244 A1 (THOMSON-CSF) 09 January 1991 (09.01.91), abstract; fig.1-15.	1-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
18 September 1997 (18.09.97)	02 October 1997 (02.10.97)

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In Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
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		US A 5486963	23-01-96
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